What Can The Electrochemical Society Contribute?

Presidential Address*

Charles L. Faust

The Board of Directors asked me to prepare a manuscript for the new booklet describing the Aims and Activities of The Electrochemical Society. In delving back through the TRANSACTIONS, I came across some interesting facts. They show that this Society represents fields in which tremendous strides in science and industry have been made. But, as members of another society, that of our United States, we might well ask ourselves if we, as individuals, are among those who have made any progress at all; or, have we even retrogressed?

There is a coincidence of circumstances about our meeting in Washington at this period which marks the 50th anniversary of the National Bureau of Standards. Various technical societies have been invited to meet here in recognition of the Bureau's long record of outstanding contributions to the industrial and scientific interests of the United States. There is a parallel of nearly identical age between The Electrochemical Society and the National Bureau of Standards and in many phases of scientific interests and accomplishment.

An important example in democracy is shown by The Electrochemical Society as we meet here in this city, where our political leadership is to be found.

In October, 1901, The Electrochemical Society was conceived in the minds of six scientists who foresaw a tremendous future for scientific and industrial electrochemistry. They invited thirty persons to gather on November 1, 1901, in a preliminary meeting at the Engineers Club in Philadelphia. Letters were sent to all members of the American Chemical Society, the American Institute of Electrical Engineers, and to other persons known to be interested in electrochemistry. Educational qualifications for membership in the American Chemical Society kept out many of the electrical engineers and others who were interested in electrochemistry, though not primarily from the chemical end.

The vision of those men and the soundness of their judgement is amply proven by subsequent events. The fifty-two persons who founded our Society on April 3, 1902, in Philadelphia were part of the 337 who said they would join an American Electrochemical Society, and who became charter members. They believed such a society an imperative necessity and that, through its instrumentality, inestimable benefits would accrue to both applied and theoretical electrochemistry. They recognized that scientists, engineers, and industrialists interested in electrochemistry were then distributed among at least a dozen different societies and had no common medium of communication.

Since that beginning in 1902, the membership has grown to over 2,000, and is international in character. Today it might well be called the International Electrochemical Society. In fact, the word "American" was later dropped from the original name to emphasize this international aspect.

In 1901, one of the founders and our first president, Joseph W. Richards, saw that the time had passed when any one society could satisfactorily cover the whole field of any one science, such as physics or chemistry, or medicine. Evidence was before him that the analogue of the specialist in science was the *society which specializes.*

The Electrochemical Society could not avoid coming into existence. Its formation was dictated, and its continuance assured, by the development of electrochemical industries and the pressing need for and the development of persons with electrochemical training.

Dr. Richards believed that the functions of the Society should be those of bringing electrochemists into personal contact with each other; of disseminating among them all the information known to, and which can be spared by, their co-workers; to stimulate original thought in these lines by mutual interchange of experience and by papers and discussions; and to stimulate electrochemical work all over the world.

No one interested in electrochemistry as covered by this Society can belong to the Society and participate in its work and meetings without receiving many times more than the small share he contributes.

The beliefs of Dr. Richards were an accurate prophesy as attested by the fact that fifty-six corporations hold sustaining memberships. Those firms comprise a listing of the leaders in the electrochemical industry.

Today, the annual volume of the products of the electroprocess industries is several thousand millions of dollars, as compared to 100 million dollars in 1901. Many of those products are not available by any other means, or are the lowest priced, or are the only source of raw materials supporting other multi-million-dollar industries.

Furthermore, the founders' prophesy and vision is seen in the gatherings of members and guests who meet with each other in a spirit of professional fraternalism. Persons of widely divergent scientific, technical, and industrial interests meet in the atmosphere of friendliness of The Electrochemical Society, as compared with the aloofness and impersonal nature of other much larger societies.

We all know that the establishment of the United States as a nation was inevitable. As man came to understand natural phenomena and became less superstitious, he awakened to the fraud of rule by divine right or by the might of one or the few over the many. The "specialist" in domination gave way in

* Delivered at the Washington Meeting of the Society, April 10, 1951.

the birth and plenty of the United States to a form of government actually old in the history of man but never attempted on the threshold of such a period of scientific and technological progress. The benefits in human comforts from such progress have been felt most of all on our continent and in a few other areas of the world, mostly in Europe. But, as ever before, the spiritual and brotherly progress of man throughout the entire world has advanced but little. Once again we stand on the very threshold of seeing true democracies slip into oblivion because of indifference or inability of men to meet in political conference with the same intellectual honesty that they insist on maintaining in meetings as scientists.

President Fitzgerald's address in May 1917 would have been appropriate today. He discussed the Society's Committee on Public Relations. There are many thoughts of infinite value to us as members of this Society and as citizens of the United States today. He asked, "Will democracy prove in this great trial that a government by the people can be carried on successfully with maintenance of the principle that the state is made for man and not man for the state?"

Today, more than ever, we ask ourselves that same question. The need today for us to get the right answer is even more important. Expert opinions are needed.

"Democracy demands something more than a government to which the governed consent." This is all too apparent in the affairs of our Electrochemical Society, as it is in our society of American citizens. In The Electrochemical Society, that demand has been and is being met. "Never can more than a few, who are chosen directors, conduct the business affairs. They, those few, have grave responsibility. The success or failure of the whole Society rests on them. This administration by a few elected directors has great advantage and, no doubt, is the most satisfactory, as long as the majority of the members give serious thought to those they elect." The progress of our Society and its meetings today attests to the real interest of its members in preserving it.

"The one disadvantage is that members do not become familiar with vital business affairs of the Society. They are even likely to take no interest in them, to their own and to the Society's loss. An individual can take chances in making changes concerning his own welfare, but a society must be more careful in experimenting with changes. If a change is made in the wrong direction, great efforts are required to bring a society back to the right path."

Changes have been necessary throughout the history of The Electrochemical Society. They have been effected, thus far, for the good of the Society and not for the wishes or personal advantage of a few individuals.

You have seen great changes in our policies and publication practice in the last four years. The elected officers studied the needs, asked for guidance by learning the wishes and interests of the members through a questionnaire in 1947. The officers and directors have been guided by the response to it. No group of directors in any democratic organization could have worked harder to learn of and to conform to the majority wishes as far as over-all conditions could permit.

It is regrettable that this same philosophy of democratic action cannot easily be transferred to the larger and extremely critical national and international situation today. In 1917, when conditions were somewhat similar, President Fitzgerald pointed out that a successful democracy comes when individuals and social groups take a paramount interest in governing problems and express that interest. Its lack, he said, is one of the most serious weaknesses in a democratic organization.

There has been, as we know today, no lack of such interest within The Electrochemical Society. Its members preserve the democratic principles in their scientific, technological, and industrial activities. Have they helped in the political field? Too often the answer will be no! Witness Dr. Fitzgerald's comment of thirty-three years ago and even more appropriate now: "The *lesson is being driven home* all the more rapidly by the struggle between democracy and another system of government characterized by a higher efficiency, according to its exponents." Can we not again say that today? But, what are the real facts?

Has the speed of "driving the lesson home," instead of increasing, nearly come to a stop? There are persons in high and low places who despise scientific, technical, and industrial achievement, as represented so outstandingly in the United States and in The Electrochemical Society. Those despisers would transform and stop further advance, because they either cannot comprehend or will not admit that only by further unhampered progress can the American principles be maintained.

In 1917, again in 1941, scientific and technical people asked themselves, and now they must again ask themselves, "How can we who can practice scientific and technological democracy in action and association transfer that ability and example to national and international problems?" The Electrochemical Society, as an organization, cannot formally take any action. Yet, its members can individually, through their local, state, and national participation in community affairs, endeavor to make the transfer. They must take the lead in doing so. They are and always will be part of the general public that has to pass on democratic principles under which they want to be governed and live peacefully.

A technical and scientific society, by its example and its members individually, can cultivate in a democracy a true appreciation of expert opinion and action. Such people are still free to exert every effort to win the interest and confidence of their fellow citizens. They can demonstrate, publicize, and show that clear thinking based on the scientific approach to problems and the orderly method of good business can solve even nonscientific or nonindustrial problems within a community of people, whether it is local, national, or international. Only by such an activity can our Society's members guard against certain dangers that can and have grown in democracies since the beginning of man and are truly present today. The development of "political experts" instead of expert politicians must be stopped. The former would ruin The Electrochemical Society if they were ever tolerated, just as they are proving injurious beyond any previous period in the community association of man.

Referring again to Dr. Fitzgerald's presidential remarks of thirty-three years ago, we can be mindful of his admonition, "The electrochemist who tries to understand political work in relation to electrochemistry will end by being neither a good politician nor a good electrochemist. In politico-electrochemical matters, we must remember that we can play only a complementary part to politicians. The politician is as useful a member of society as is the scientist, the technologist, and industrialist, as long as he is an 'expert politician' and is not a 'political expert.'"

In electrochemical matters, this Society has admirably followed that advice. The founders were embued with the

idea of service which electrochemistry could render mankind. Electrochemistry has done so in the inanimate sciences and industry, and is on the threshold of equally great accomplishments in the fields of human and animal health, and in agriculture and biology.

Further growth and new horizons are before us. Electrochemistry and electrochemical techniques and instrumentation are growing in importance in the natural sciences. Action has already been started to get persons in this field to become a part of this Society.

We must remember, though, that all such progress can be lost without proper citizenship responsibility in training and conserving our manpower—our most important natural resource for preserving our kind of democracy.

I wish it could be said that people in general have followed such advice as Dr. Fitzgerald's on the use of expertism on the national and international scene as well as our Society has in its own affairs. He pointed out, "Let us remember that no matter what advances we make towards the development of new processes and inventions [and we've made bountiful progress since his comments], we are only doing half our duty and cannot in justice pose as benefactors of humanity, unless we also do our part in seeing to it that the results of our labors are so wisely employed that they will prove blessings rather than a curse."

On the latter, scientists and technologists have fallen down. Too often when they have taken any part in national and international policy, there have been those who have forgotten their scientific method and have rushed to give advice, express an opinion, and even to take action on the basis of groundless opinion and emotional expediency, without regard for or even demanding the true facts and without heed to the lessons of history.

The officers and directors of your Society have endeavored to make decisions and to take actions for the best good for the greatest number of members, and not for the good of a special few. I can see that this policy will be continued by your newly elected officers and directors, and I express the hope that the members will extend such democratic principles to others through their individual actions in their social and political groups.

Let us all remember and preach that no government-planned or government-controlled system has ever given people as much as free Americans have earned for themselves.

Der Internationale Scientist[1]

III. Sir Humphry Davy – Aufreiss und Abfall

Sol Neman

Geschichte ist meistens unzuverlaessig; die Wahrheit ist all-zu-oft in den Misten des Altertums versunken. Und so mit dem Leif von Humphry Davy (1778–1829), von dem gesagt wurde, er waere blos e' Sauerpuss. Das ist e' Leih und e' Schlender, aber es muss doch geadmittet werden, er war e' Heisskopf; weshalb er mit seinen Experiments viel hartes Glueck hatte, und seine Arbeit demgemaess soffern musste.

Noch nicht 30 Jahre alt, und schon laengst Professor und Labdirektor der Royal Institution of London, wunderte er, warum der Esau so eckseited bekam, ueber den Wert einer miesligen Mess von Pottasche (Genesis *25*:29); koennte das wohl Gold oder ennihau Uranium enthalten? Also bildet er einen grossen Voltapeil und elektroleist e' Mess Pottasche. Doch er ketscht daraus nichts als e' Pintsch Kalium[2], und es weiss doch jeder, dass Kalium mit ein wenig Wasser sofort zu Pottasche rewertet. Also war das Experiment e' Bost, und oh boi! war der Davy selbst aufgebrannt!

Zunaechst wurde er wirklich fuer e' Reit genommen—e' Scharfschuter von der Offis von Naval Resoerch hat ihn in ein Bett geniedelt an e' Rehs zwischen zwei Wahrschiffe. Der Davy wusste auch e' Trick, und hat heimlich grosse Zinkplehts an sein Schiffsfaenni genehlt; denkt er: das gibt mit den Kupferplatten am Kiel die groesste Batterie in der Welt, mit so viel Kick, wir koennen dem anderen Skipper schur eine reine Paar Hiels zeigen. Leider musste er auf dem harten Weg lernen, dass Zink in dieser Kombination ein gutes Oligodynamischeneffect-neutralisationsmittel ist; das Schiff das er gebeckt hatte, war so mit Algae und Barnickels aufgefault, dass ess am Pohst gelassen wurde. Das machte ihn so heiss unter dem Kollar, er musste 16 Liter Giggelgas[3] schnaufen um abzukuhlen. Und so hat er zum zweiten Mal das Boot gemisst.

Die dritte Idee müsste doch klicken (meint der Davy); warum nicht Diamant aus Kohle? Erst eine kolossale Batterie[4]—2000 Metallkuppel, 128000 Skwerrintsch Plattenarea—an Kohlenstifte gekonnecktet; zwar keine Diaman ten doch e' 4-Zoll lange elektrische Ark. "Heisser Stoff," kroht er "dies Mal e' Tennstreik; nun haben wir den Kieh zur Strietleitung."[5] Doch schon am Abend liest er in seiner Bibel, dass er zu leht war; denn, wie es jeder Student weiss, war es der Noah der zuerst (auf Maunt Ararat) die Ark geleitet hat. Und dann hat Davy aber wirklich die Ehr geblistert!

Drei Streiks und aus! Der Davy war so loh in sein Meind, dass er nie wieder mit der Elektrochemie gemeddelt hat und von dann an blos ganz ordinaerige Dinge taeckelte, wie Nitrogen Chlorid (damit[6] hat er fast e' Ei verloren) und Sehftilemps. Auch hat er viel Zeit gewestet, zu prufen, dass Wasser H_2O ist—e' ganz unnessessaerige Arbeit, denn das weiss doch bei uns schon jeder Schulboi.

Und wenn das Leif von Davy eine Moral hat, was ich selbst daute, ist es blos dies: der Sohrhett bleibt immer e' Socker.

[1] We are glad to note that the reactions of our readers have encouraged the Herr Doktor to resume his historical researches.—Ed.

[2] He also bore the odium of isolating sodium.—E. C. Bentley.

[3] Obscure; probably the gas variously designated by Davy or his contemporaries as dephlogisticated nitrous air, gaseous oxyd of azote, nitrous phosoxyd, etc., now known as nitrous oxide. Cf. J. C. Gregory, "The Scientific Achievements of Sir Humphry Davy," London (1930)—Ed.

[4] H. Davy, *Phil. Mag.* (1810).

[5] Auch e' Flopp. Denn sogar der Inwenntor des Arkleits (1880) konnte nicht e' Tripp durch Deutschland machen, weil alle Leute ihn als Herr Brush gegrietet haben.

[6] Das hat auch zur Zeit der Davy gesagt: damit! Cf. also Gregory, *loc. cit.*, p. 91.

Current Affairs

Fifth Annual Battery Research and Development Conference

The Battery Division of The Electrochemical Society was well represented at the Fifth Annual Battery Research and Development Conference, held at Asbury Park, New Jersey, May 16th and 17th. Members of the Division who took an active part in the program were: Charles H. Clark, Roy C. Kirk, Arthur F. Daniel, William Shorr, and Eugene Willihnganz. This conference, sponsored by the Signal Corps Engineering Laboratories, is held each year under the direction of Grenville B. Ellis, Chief of the Power Sources Branch of the Laboratories.

Highlighting the meeting, which attracted more than 250 representatives of the battery industry, was the announcement by the SCEL of the establishment of facilities for the large-scale production of synthetic manganese dioxide for use in dry cell batteries, and of the development of a line of special purpose "one-shot" batteries for use with guided missiles, pilotless aircraft, rockets, and similar equipment. These new special purpose batteries reduce by more than threefold the size and weight of the more standard type batteries previously employed for these applications. It was also announced at the conference that the magnesium dry battery, which has more than twice the capacity of the conventional dry cell and uses non-critical materials in place of zinc, will be procured on educational-production type contracts for field and laboratory testing prior to being used extensively in the field.

Manganese Dioxide

At the morning session on May 16th, Charles H. Clark, SCEL, spoke on the Signal Corps' manganese dioxide program. A one-ton-a-day plant has been established for the production of electrolytic manganese dioxide, the process for which had been previously developed by the Signal Corps. Use of this ore in dry cell batteries results in a more than threefold increase in dry battery capacity. As soon as the process variables for the production of this synthetic ore are established in this plant, facilities will be expanded considerably to meet all military and civilian requirements for this improved battery depolarizing material.

Primary Batteries

Roy C. Kirk, Dow Chemical Company, discussed the improvements that had been made during the past year in the magnesium dry cell. An improved magnesium alloy has been developed, which should eliminate the greatest objection to the magnesium cell, that of a few seconds' delay required to build up to desired voltage after closing the battery circuit. Arthur F. Daniel, SCEL, indicated that plans are active for the procurement of quantities of Signal Corps battery types using magnesium anodes for extensive field and laboratory testing and evaluation prior to their issuance to the troops.

The afternoon session on May 16th was devoted to the presentation of four papers on the low temperature characteristics of primary batteries. Alfred B. Garrett, Ohio State University, presented the results of fundamental investigations on electrolytes and electrochemical systems leading to information that can be used in the development of primary batteries which will operate at temperatures as low as −100°F. A specially constructed battery, employing a magnesium anode, gave more than 500 times the operation at −65°F than obtained with a cell of ordinary construction. Millard F. Gill, Olin Industries, and Albert F. Vinal, National Carbon Company, spoke on the development of low temperature Leclanché batteries. During the past year, both of these organizations concentrated their efforts on the development of batteries capable of operation to temperatures as low as −40°F. A number of these batteries were procured by the Signal Corps and fulfilled an important requirement for successful winter operation in the Korean area. Efforts during the next year will be concentrated on extending the low temperature performance to −65°F.

The second session, held May 17th, was opened with a discussion by R. E. Ralston, P. R. Mallory & Company, Inc., of the development of miniature dry cells, ranging in capacity from 50 to 150 milliampere hours. William Shorr, SCEL, then reviewed the Signal Corps sponsored developments in the field of alkaline dry batteries. He stated that a new conductive plastic, developed by the Markite Company, has been used successfully in making an all-plastic case for alkaline dry batteries. He also described the use of radioactive tracer techniques in evaluating the diffusion characteristics of various separator materials.

Analytical Methods

H. Knapp, SCEL, concluded the morning session by describing some of the new analytical methods being developed at the Signal Corps Engineering Laboratories and by Foster D. Snell, Inc., for the analysis of battery component materials. These methods are not only more accurate and rapid than those previously used, but employ many of the new analytical techniques and tools recently developed.

Secondary Batteries

At the afternoon session on May 17th, Eugene Willihnganz, National Battery Company, described his investigations on the development of techniques for efficiently charging lead-acid batteries at subzero temperatures. Dr. Willihnganz has developed an hypothesis for the mechanism of the charge reaction at −40°F. It is believed that the poor charge rate of the negative plate is due to impurities in the expander. The poor charge acceptance of the positive plate may be due to the slow rate of reaction

between an oxygen layer that is established on the plate and the dissolved lead sulfate. Further work is contemplated to elucidate the charge mechanism before techniques can be established to eliminate the poor charge acceptance at low temperatures.

Special Purpose Batteries

Nicholas T. Wilburn, SCEL, in opening the discussion on special purpose batteries, reviewed the progress made to date and the Signal Corps' future plans in this field. He stated that a standard line of high rate "A" and "B" power batteries, employing the zinc-silver peroxide system, is being developed. The use of these standard line batteries results in a more than threefold reduction in size and weight over batteries employing more standard electrochemical systems. This standard line will also enable the procurement, on an "off-the-shelf" basis, of the special purpose batteries, eliminating the need for the development of a special battery for each and every new application. Dr. Johan Bjorksten, Bjorksten Research Laboratories, reported on the use of printing techniques in the development of extremely thin battery plates, which will find extensive application in various types of special purpose batteries. Other electrochemical systems and techniques, such as the molten electrolyte cell, also are being considered for these battery types.

Mr. Grenville B. Ellis concluded the meeting with a general review of the accomplishments of the Signal Corps sponsored research and development program and discussed the plans for future activity.

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Because of their restricted nature, papers presented at the conference are not available in published form.

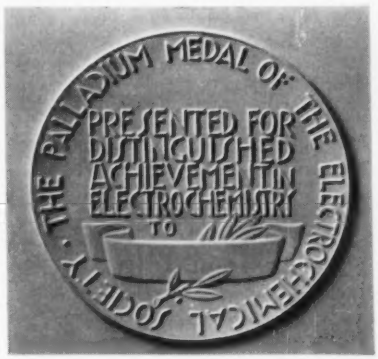
Sculptor Finishes Models for Palladium Medal

Plaster models of the new Palladium Medal to be awarded by the Society have recently been completed. They incorporate a motif proposed by a committee made up of R. M. Burns, J. C. Warner, N. Hackerman and H. H. Uhlig. The present design, as shown in the photograph, is the work of the sculptor, C. L. Schmitz. The medal will be produced by Medallic Art Company of New York City.

From the present plaster models of back and front sides, copper replicas will be made using an electroforming process. Steel dies, in turn, will be cut in accord with the minute details of the replicas by a special machine similar to machines used at the United States Mint. The dies are then hardened, and are suitable for stamping out the medal from blanks of palladium sheet. All the fine details of the sculptor's work are faithfully transferred to the medal which is perhaps only one-fourth the size of the original plaster models.

The use of palladium for the medal explains the figure of Greek goddess Pallas Athene after whom palladium, a member of the platinum group metals, was named. According to mythology, she was born of Zeus, springing from his head fully grown. She was universally regarded as the incarnation of her father's great wisdom and judgment, and thus was considered the ideal of reason, the patroness of the arts and crafts of peace, and the deity of just and scientific war. The latter connection explains her helmet and the breast plate with Gorgon's head (a symbol of cold-blooded wisdom) and also the aegis or shield like that of her father, and the long spear. She was always thought of as a cool, aloof intellectual with a mind unhampered by an unruly heart.

Her appearance on the Palladium Medal shows her with the seal of the Society inscribed on her shield. She


THE PALLADIUM MEDAL OF THE ELECTROCHEMICAL SOCIETY
PRESENTED FOR DISTINGUISHED ACHIEVEMENT IN ELECTROCHEMISTRY
TO

protects from the four Greek elements the seven ancient metals, represented by their alchemical symbols. The Greek elements are depicted traditionally by the square of Empedocles at the corners of which are earth, air, fire, and water. Earth is represented at the right of Pallas Athene by a group of mountains, and air is at the left shown by a cloud. Fire lights up her head and water laps her feet. The smaller square inside, intersecting the midpoints of the larger square, represents the four qualities of Empedocles: hot, dry, cold, and wet. Space did not permit their representation beyond the square itself.

Outside the larger square are the alchemical symbols for the metals beginning with silver at the lower left hand section represented by the moon, and followed, in clockwise direction, by iron, copper, mercury, gold, lead, and tin.

The metals, in other words, are held secure by Pallas Athene against the corrosive influence of their environment. Her character and reputation eminently qualify her as advocate of this continuing "just and scientific war" which has as its purpose the preservation of the metals upon which our present civilization so much depends. Since attack of metals by the soil, the atmosphere, water, or elevated temperatures proceeds by mechanisms essentially electrochemical, it is appropriate that Pallas should use the seal of The Electrochemical Society to wage her symbolic battle against those influences that would destroy the metals.

The Palladium Medal is made possible by royalties received by the Society from sales of the *Corrosion Handbook* which was sponsored by the Corrosion Division of the Society when the Division was first organized. The Handbook was published in 1948 by John Wiley & Sons Inc., New York, and has been received popularly both in this country and abroad. The first Palladium Medal will be awarded at the Detroit meeting this coming fall.

Mallory, Sharon Form Firm to Produce Titanium

A new company, the Mallory-Sharon Titanium Corporation, has been formed by P. R. Mallory & Company, Inc., Indianapolis, Indiana, and the Sharon Steel Corporation, Sharon, Pennsylvania, for the development, production, and marketing of titanium and titanium alloys. Each company will have a 50 per cent interest in the new firm. Its office will be located in Indianapolis. Officers who have been elected are: P R. Mallory, chairman of the board; James A. Roemer, president; F. H. Vandenburgh, vice-president and general manager; E. N. Crosier, treasurer and assistant secretary; and George Fotheringham, secretary and assistant treasurer.

Aluminum Expansion Planned in Canada

Plans to launch immediately a new expansion program in the Canadian aluminum industry, involving the first stage of a vast aluminum development in British Columbia, and construction of another major hydroelectric power plant in the Province of Quebec, were announced by Nathanael V. Davis, president of Aluminium Limited, at the recent annual meeting of the company.

The Canadian developments are to be undertaken by the company's subsidiary, Aluminum Company of Canada, Ltd., and operations to provide the needed alumina, derived from bauxite ores, will be expanded in the Caribbean area.

The program planned involves an estimated expenditure of $220 million, of which $160 million are required for the British Columbia development, including the alumina facilities. The remaining $60 million are to be used for the new 200,000 hp hydroelectric plant in the Saguenay district of northeastern Quebec, together with new aluminum ingot facilities to be built in the district.

A major engineering project in the undeveloped area 400 miles northeast of Vancouver will provide the low-cost electric power for the plant in British Columbia, and a new town to house the working force will be built near the Indian village of Kitimat.

The expected increase in Canadian aluminum productive capacity resulting from the expansion is 150,000 metric tons (330 million pounds) per year, bringing total usable integrated capacity over the 550,000-ton mark.

Standard Steel Spring New Sustaining Member

The Society is glad to welcome the Standard Steel Spring Company of Coraopolis, Pennsylvania, as a Sustaining Member.

This company is one of the major automotive spring manufacturers, and in addition is an important fabricator and plater of bumpers. Their interest in electrodeposition from the standpoint of bumper production and their development of corronizing (an alloyed coating of electrodeposited nickel and zinc) should make the membership of mutual benefit to the company and to the Society.

New Tin Coating Gauge Developed by U. S. Steel

Less than 6 ten-millionths of an inch (0.0000006 inch) is measured by a new tin plate coating thickness gauge devised by the research laboratories of United States Steel Corporation. Adaptable to measuring various thicknesses for different kinds of cans, this gauge is capable of measuring coatings with a precision of approximately 1 per cent.

To obtain close control of hot-dipped coatings, a combination of industrial x-ray and the Geiger counter are used. Measurement is made by exposing a sheet of tin plate to an x-ray beam for a short interval and, at the same time, measuring with a Geiger counter the secondary rays reflected by the steel beneath the tin coating. The tin traps some of the secondary x-ray radiation. That reaching the counter has been found to be in inverse proportion to the thickness of the tin coating.

Tin plate thickness gauges of this design are already in production use in the tin mills of several United States Steel subsidiaries. The x-ray-Geiger counter gauge offers three great advantages over earlier chemical methods of measuring tin coatings: it is faster, more accurate, and, at the same time, the tin plate is not destroyed or marred.

Foote Mineral to Double Lithium Output

Foote Mineral Company's new $214,800 expansion program to enlarge the present facilities at their Exton, Pennsylvania, plant will be used primarily to double the company's production of lithium in the primary stage.

To meet the growing demand for lithium of all types, Foote plans to process the lithium-bearing ores mined at their newly acquired source at Kings Mountain, North Carolina. The tract covers 881 acres and gives the company control of the largest known, all weather source of lithium in the Western Hemisphere, they say. Production is scheduled for early fall.

Sulfur Extraction Plant for Phillips Chemical

Phillips Chemical Company will start construction of a large sulfur extraction plant, located in the Permian Basin oil fields near Goldsmith, in West Texas, according to a recent announcement.

The plant is designed to extract from natural gas nearly a quarter of a million pounds of elemental sulfur per day. The output will be used in connection with the company's ammonium fertilizer plant at Adams Terminal near Houston.

Chemical Engineering Gets New Building at Wisconsin

The applied electrochemistry laboratories at the University of Wisconsin will be housed in a new building in 1952. Excavation was started in April for the foundation of the new Chemical Engineering Building which is to be the east wing of the new Engineering Building, the first section of which was dedicated on May 4th of this year. The Chemical Engineering wing is to be devoted entirely to laboratory space and equipment. Its construction was made possible at this time through the assistance of the Wisconsin Alumni Research Foundation which provided $500,000 in addition to the $385,000 coming from State appropriations for a total of $885,000.

The Chemical Engineering Department has been inadequately housed for a long time. At present it occupies the original Chemistry Building built in 1887. When a new Chemistry Building became available in 1905, the old one was occupied in part by the newly established Department of Applied Electrochemistry and Chemical Engineering (the Applied Electrochemistry was dropped from the title in later years) under the direction of the late Dr. Charles F. Burgess. This department was the outgrowth of the four-year Applied Electrochemistry Course established in 1898 by Dr. Burgess as a separate unit within the Electrical Engineering Department, which then was being directed by Professor Dugald C. Jackson.

OWS

An Open Letter to the Membership

For some time the Board of Directors have wanted to report to you the financial situation of the Society. This was difficult for a number of reasons, the chief one being that for many years the Society was paid in advance for TRANSACTIONS which it did not deliver for several years. During this time printing costs increased and we really did not know the real worth.

The Society operates on a budget. We are not particularly happy with the financial situation, but at least we are able to predict our costs, and our ability to meet them.

Your Society has certain funds, such as the Acheson Medal and Weston Fellowship Funds, which cannot be used, since they were donated for a given purpose, on which the interest only is available.

The cash, or operating fund of the Society, is $28,000.

This year the JOURNAL expense has been budgeted at $38,000 and the Secretary's Office at $20,000. Therefore, it is costing us $58,000 to operate. Thus, you see that our working capital is equivalent to less than six months' operation. I believe you will all agree that this is low.

The Society income is estimated as follows:

2,080 members—dues	$25,000
Sustaining members	6,500
Sale of Journals to nonmembers	6,500
Sale of past publications such as back Journals, Modern Electroplating, Cathodic Protection, etc.	11,000
Income incidental to Conventions	2,000
And, we have budgeted for advertising which we are not sure we can get	5,000

This totals $56,000 so you see we are operating in the red $2,000 this year.

Next year we estimate that the budget will be about $60,000 if publication costs are not increased. However, there is always a strong temptation to increase these costs since, as a result of the larger number of papers being scheduled for the annual meetings (almost three times as many in 1951 as in 1948), many more papers of acceptable quality are being submitted to the JOURNAL.

A year ago the Board adopted advertising, not because they wanted it, but because there was a belief that the Society income could be augmented thereby.

This is not a plea for you to take special efforts to increase advertising, but it is obvious that if it can be increased, we will come nearer to balancing our budget. Neither is this a trial balloon preparatory to raising dues, although that is a second alternative.

In considering our expenses, remember that all of the present elected officers, and all the Editorial staff, excepting the Managing Editor and her assistant, serve without compensation which is to be expected, since after all ours is a Scientific and Engineering Society. The purpose of placing these figures before you is to familiarize you with the financial situation so that you may help the Board take whatever steps become necessary to continue to operate on a sound basis.

RALPH M. HUNTER

MEETINGS OF OTHER ORGANIZATIONS

GORDON RESEARCH CONFERENCE, New Hampton, N. H., July 23–27.

INTERNATIONAL CONGRESS ON ANALYTICAL CHEMISTRY, United Kingdom, August 8–13.

AMERICAN CHEMICAL SOCIETY, Diamond Jubilee Meeting, 120th national meeting, New York City, September 3–7.

XVITH CONFERENCE OF THE INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY, New York City, September 5–8.

INSTRUMENT SOCIETY OF AMERICA, sixth national instrument conference and exhibit, Houston, Tex., September 10–14.

Electroplaters' Convention July 30–August 2

The 38th Annual Convention of the American Electroplaters' Society will be held at the Statler Hotel, Buffalo, New York, July 30th to August 2nd.

The tentative technical program that has been arranged will start Monday A.M. with the Keynote Address by Dr. William Blum, National Bureau of Standards, on "Research on Electrodeposition." Sessions following this will be: Monday P.M., "Some Engineering Aspects of Plating Room Operation"; Tuesday A.M., "Finishing and Plating Diecastings"; Tuesday P.M., round-table discussion on "Substitute Finishes"; Wednesday A.M., "Plating Control"; and Thursday A.M., "A.E.S. Research."

SECTION NEWS

Chicago Section

At the final meeting of the season, on May 4th, the Chicago Section elected the following officers for the coming year:

Chairman—R. Scott Modjeska
Vice-Chairman—Simon Gary
Secretary—Howard T. Francis
Treasurer—Werner Jacobson

After the election of officers, travel films were shown and a social meeting was held. Everyone attending agreed that it was a pleasurable ending to the season's activities.

J. H. CONOLLY, *Secretary* (1950–51)

Cleveland Section

The annual Ladies Night, marking the close of the current season of the Cleveland Section, was held on May 11th. A social hour and dinner meeting, attended by 62 members and guests, took place at Crosby's Restaurant.

Following the dinner, a group of 85 members and guests attended a theater party at the Karamu Theater, where they saw the play "Lost in the Stars."

This year, the Ladies Night meeting was acclaimed even more of a success than last year's, both in attendance, sociability, and fine entertainment.

* * *

New officers elected for the Section are as follows:

Chairman—H. C. Froelich
Vice-Chairman—L. E. Pucher
Secretary—N. C. Cahoon
Treasurer—W. H. Stoll

LEO E. PUCHER, *Secretary* (1950–51)

New York Metropolitan Section

The final meeting of the 1950–51 season was held by the New York Section at the Holley Hotel on May 2. This meeting had been designated as Ladies Night and members were invited to bring their wives. This was a new departure for the Section and it met with great success. Favors and door prizes were contributed by several companies and the Section presented corsages to the ladies.

At the business meeting, officers for the coming year were elected as follows:

Chairman—J. S. Mackay
Vice-Chairman—A. C. Loonam
Secretary-Treasurer—F. A. Lowenheim
Members of the Executive Committee—H. Bandes, H. R. Copson, M. F. Quaely, M. B. Diggin

Dr. Fred E. Carter, Director of Phys-

ical Research at Baker & Company, Inc., New York, spoke to the gathering on the subject, "Precious Metals." His wide experience, dating back to 1916, enabled him to bring his listeners up to date on developments in gold, silver, and the six platinum metals. In speaking of the precious metals, Dr. Carter steered a middle course between a technical and a popular talk so that it would appeal to the electrochemists present and to the (presumably nontechnical) ladies.

The speaker outlined the many uses for the platinum metals and in particular emphasized their great industrial importance which is often overlooked in view of their use in jewelry and other nonindustrial applications. He also reviewed methods of mining and refining some of the metals and showed some interesting samples both of the coinage and jewelry applications, and of industrial uses.

F. A. LOWENHEIM, *Secretary*

Niagara Falls Section

Officers of the Niagara Falls Section of The Electrochemical Society elected for the year 1951–52 are:

Chairman—Joseph N. Brennan
Vice-Chairman—Morton S. Kircher
Secretary-Treasurer—Harry R. Oswald

HARRY R. OSWALD,
Secretary-Treasurer

Philadelphia Section

The May meeting of the Philadelphia Section was held at the Frick Chemical Laboratory of Princeton University on Saturday, May 12th. Dr. N. Howell Furman, Chairman of the Department of Chemistry at Princeton and President of the American Chemical Society, welcomed the group, and Dr. Arthur Osol, Section Chairman, thanked him on behalf of the Section for his kind invitation. Dr. Osol then introduced the speaker for the evening, Dr. Clarke Thorp of the Armour Research Foundation of the Illinois Institute of Technology. Dr. Thorp spoke on the research being done at the Foundation on the properties of ozone.

Ozone, he said, is prepared by an electronic discharge through oxygen. In principle, the method is very efficient, since one electron should be able to dissociate five molecules of oxygen, but as yet, only much lower yields have been obtained. The electrolysis of perchloric acid has thus far proved to be a more efficient process.

Techniques have been developed for liquefying mixtures of O_2 and O_3, and for fractionating the liquid. The O_2-containing liquid is dark blue, while the pure liquid O_3 is very deep blue—almost black. The pure liquid is a detonator, although it can be handled safely if it is properly prepared. Some of the effects of "bad" ozone were demonstrated in a sound film which Dr. Thorp showed at the end of his talk. A small amount of "good" ozone could be evaporated safely from an aluminum container, but improperly prepared samples detonated violently and pierced the cups. Below −158°C, liquid O_2 and O_3 are not completely miscible, and form a two-phase system.

Studies at the Foundation indicate that ozone gas is not as toxic as formerly believed, although Dr. Thorp at one time was himself overcome, and thus became a statistic, at a fairly high concentration of O_3, though happily at a short exposure time.

The speaker gave many examples of the powerful oxidizing properties of ozone reactions. It dissolves in many organic solvents, and is useful in many reactions in solution form. However, Dr. Thorp cautioned that benzene or other aromatic solvents have consistently shown to be explosively unstable, and recommended against the use of O_3 under such conditions.

Ozone has been used in this country in water purification, and abroad, extensively as a bleaching agent.

Dr. Thorp answered questions from the floor after the talk, and the meeting, which followed a tour of the Princeton campus and a dinner at the Princeton Inn, was adjourned with a rising vote of thanks to the speaker.

* * *

The following officers have been elected for the 1951–52 year:

Chairman—John F. Gall
Vice-Chairman—J. F. Hazel
Secretary—Edgar L. Eckfeldt
Treasurer—George F. Temple

J. F. HAZEL, *Secretary* (1950–51)

Pittsburgh Section

The Pittsburgh Section held a joint meeting on May 10th with the local section of the American Electroplaters' Society.

Dr. John Kronsbein presented an interesting talk on "Current Distribution and Deposit Thickness in Electroplating."

The speaker discussed the factors that govern the uniformity of electrodeposits, especially the influence of current distribution and of cathode geometry. Of special interest were the results of his experiments with bent cathodes, showing that the degree of bending affects the uniformity of deposit thickness. Thick deposits were studied by means of microscopic examination of etched sections. Extremely thin deposits were measured with the aid of radioactive copper isotope to obtain the variation of deposit thickness across the bent cathodes. Despite the difficulties involved in working with such a short-lived isotope the results again demonstrated a marked influence of cathode geometry upon the thickness of electrodeposits.

The discussion that followed the lecture was long and lively, and the speaker greatly contributed to its success in a spirited and learned manner.

M. T. SIMNAD, *Secretary-Treasurer*

San Francisco Section

The March 21st meeting of the San Francisco Section, held at the St. Julien Restaurant, San Francisco, was addressed by Mr. H. A. Doerner, chief of the Metallurgical Division, Region III, U. S. Bureau of Mines. Mr. Doerner spoke on "Metallurgical Research of the Bureau of Mines."

The speaker introduced his subject by giving a brief history of the Bureau, its organization, and the scope of its work. The Metallurgical Division, he said, has as the principal object of its research work the conservation of our mineral resources on a long range basis.

Four stations are included in Region III of the Bureau of Mines, Mr. Doerner said. They are located at Berkeley and Redding, California, and Reno and Boulder City, Nevada. The Berkeley station specializes in thermodynamic measurements of materials such as specific heats at high and low temperatures. The Redding station was originally set up to work out processes for the purification of local ores. At the present time the use of manganese in the production of steel is being investigated to determine the minimum amount necessary. Manganese is our most critical raw material as far as steel is concerned.

At the Reno Station, ore dressing and analytical laboratory service are provided for the Mining Division of the Bureau of Mines and for private enterprises. Most of the pilot plant work is carried out at Boulder City. Slides were presented showing views of some of the equipment there.

Mr. Doerner then discussed in some detail the processes for the production

of zirconium and titanium as developed at Boulder City. A certain amount of these metals is being produced and is being used almost entirely to meet military requirements. Both the pure metals and alloys are being made.

A lively question and answer period followed the talk.

* * *

The next meeting took place on April 18th, when the Section was honored by having as its guest Dr. Ralph M. Hunter, President of the Society.

Dr. Hunter spoke briefly about the recent meeting in Washington, and other activities of the Society. He stressed the Society's desire to further the teaching of electrochemistry and allied subjects in our colleges and universities.

The guest speaker delivering the technical address was Mr. H. S. Newhall, Manager of the Electrothermic Division of Pittsburg Lectromelt Furnace Corporation, who spoke on "Electric Furnaces in the Chemical and Metallurgical Fields."

Mr. Newhall described briefly the three major types of electric furnaces: (1) the direct type used principally in melting steel and special nonferrous materials, (2) the resistor type used principally for laboratory work and calcining and heat-treating operations, and (3) the electrode type used mainly for the production of high quality carbon and alloy steels. There are three different designs of electrode type furnaces: indirect arc, smothered or submerged arc, and slag resistant. The latter two types were discussed in more detail.

The advantages and disadvantages of various electrode arrangements were also discussed. Later, Mr. Newhall touched upon electrode materials, particularly upon the Söderberg self-baking electrode widely used abroad. However, because of the low cost and high quality of prepared electrodes available in this country the self-baking electrode finds little use here.

R. F. Bechtold, *Secretary-Treasurer*

Washington-Baltimore Section

The Washington-Baltimore Section held its final meeting of the year on May 17th at the National Bureau of Standards. After a brief resume of the progress made by the Section in its first two years the retiring chairman, Paul L. Howard, turned the meeting over to the new chairman, Dr. Abner Brenner. The members of the new executive committee are as follows:

Chairman—Abner Brenner
Vice-Chairman—R. S. Dean
Secretary-Treasurer—J. C. White
Program Chairman—Fielding Ogburn
Entertainment Chairman—E. M. Otto
Membership Chairman—Leo Waldron
Local Section Advisory Committee—
—K. M. Huston, Samuel Eidensohn
Advisory Group—William Blum, J. P. Marble, Marc Darrin
Ex-officio—Paul L. Howard

Mr. Dwight E. Couch of the Electrodeposition Section of the National Bureau of Standards addressed the Section on "The Electrodeposition of Aluminum from Nonaqueous Solutions." Some of the possibilities and limitations of the fused salt baths were discussed and the more significant work which has been done with organic solvents was reviewed.

A new bath, prepared from organic type solvents and capable of operation at room temperatures, was described. It has many advantages over existing baths since it is easily prepared and operated. Moisture from the air will slowly destroy the bath but it is not highly sensitive to small traces of water. There is no electrolytic decomposition in the bath and it may be operated at current densities up to 5 amp/dm^2 with an optimum current density of 2 amp/dm^2. At this current density the aluminum will deposit at about 0.001 in./hr. The throwing power is good so there is no difficulty in plating odd shaped objects. The anode and cathode efficiencies are about 100 per cent. It is possible to prepare deposits as thick as 0.020 in. and, by periodic reverse current plating, 0.035 in. coatings have been prepared. The hardness of the aluminum deposits depends upon the conditions of deposition and may vary from 37 to 97 Vickers. They were produced by the use of addition agents and are brittle. The softer deposits are very ductile and may be bent many times without breaking. Samples were exhibited and plating procedures demonstrated by Dr. Brenner.

It was announced that the Section's annual picnic will be held on September 8th at the Pinecrest Recreation center. This is a family affair for all the members, and was well attended last year.

Paul L. Howard, *Former Chairman*

PERSONALS

L. B. Rogers of Massachusetts Institute of Technology, Cambridge, Massachusetts, has been promoted from assistant professor to associate professor.

Julian Glasser, physical chemist at Armour Research Foundation of Illinois Institute of Technology, Chicago, has been named technical aide on titanium and zirconium research in a new metallurgical unit of the National Research Council.

Ling Yang, Frick Chemical Laboratory, Princeton University, will go to Carnegie Institute of Technology, Pittsburgh, on a post-doctorate research fellowship, beginning July 1st. Dr. Yang's work will be on the mechanism of crystal growth.

NEW MEMBERS

In May 1951 the following were elected to membership in The Electrochemical Society:

Active Members

Christian H. Aall, Monsanto Chemical Company, Anniston, Ala. (Electrothermic)

Donald W. Baird, Sylvania Electric Products Inc., mailing add: 35-22 Linden Place, Flushing, N. Y. (Electronics)

Wallace W. Beaver, Brush Beryllium Company, 4301 Perkins Ave., Cleveland, Ohio (Electrothermic)

Thomas Brandes, Van der Horst Corporation, 1645 E. State St., Olean, N. Y. (Electrodeposition)

James G. Buck, Sylvania Electric Products Inc., mailing add: 234-06 133rd Ave., Laurelton, N. Y. (Electronics)

John R. Bukey, Firestone Plastics Company, Pottstown, Pa. (Electric Insulation)

Hyman Chessin, Department of Chemistry, Kenyon College, Mail: P. O. Box 342, Gambier, Ohio (Electrodeposition and Theoretical Electrochemistry)

David R. Gallardo, Industrias Unidas, S.A., Apartado Postal 16783, Mexico D.F., (Industrial Electrolytic)

Sidney A. Greenberg, Sylvania Electric Products Inc., mailing add: 210 North Main St. Towanda, Pa. (Electronics)

Gerald G. Hatch, Armour Research Foundation, 35 W. 33rd St., Chicago, Ill. (Electrothermic, Electrodeposition, Electronics, and Industrial Electrolytic)

Louis Haug, Jr., National Union Radio Corp., Hatboro, Pa. (Electronics)

John L. Jones, U. S. Naval Ordnance Test Station, mailing add: 4830 O'Sullivan Drive, Los Angeles 32, Calif. (Battery)

(*Continued on page 103C*)

BOOK REVIEWS

METALLURGICAL THERMOCHEMISTRY by O. Kubaschewski and E. Ll. Evans. Published by Academic Press, Inc., New York, and Butterworth-Springer, Ltd., London, 1951. xi plus 368 pages, $6.00.

This monograph is intended to present basic thermodynamic data to metallurgical chemists in research laboratories and to process metallurgists. The term "metallurgical thermochemistry" covers both calorimetric data (enthalpies and entropies) and free energy data (derived from equilibrium and electromotive force measurements). The first chapter summarizes the principles of chemical thermodynamics for a reader who has learned these principles from a textbook of physical chemistry. The second chapter reviews extensively the various experimental methods, in particular for calorimetric measurements, the determination of the electromotive force of galvanic cells at elevated temperatures, and equilibria between metals, alloys, compounds, and a gas phase. The third chapter gives information on how to estimate thermodynamic data (e.g., specific heats and entropies) if direct measurements are not available. The fourth chapter contains 99 pages of tables of numerical values. Finally, a few illustrative examples for use of these data are given. An extensive bibliography is included.

The review of experimental methods will be welcomed by all investigators, since it will be helpful in the selection of methods which are most appropriate for special purposes.

The compilation of experimental data will be of great value to all who want to apply available data to a special problem.

Unfortunately, necessary minus signs for ΔH and ΔG values have been omitted in Fig. 15, 18, 22, 23, 24, 26, 27, 90, 91, and 92 and in Table XVIII.

On pages 28 to 30, the authors explain how one may calculate the change in free energy for higher temperatures if the basic values for 298°K and the specific heats of the reactants are given. To this end one has to evaluate integrals from $T = 298$ to T, but the authors suggest the calculation of the difference of the integrals between the limits $T = 0$ and T and between $T = 0$ and $T = 298$, respectively. Upon use of the recommended power series for specific heats above 298°K, there occur integrals of the form $\int_0^{298} T^n dT$, which, for negative values of n, are infinite and therefore meaningless. In the numerical examples, the authors employ tacitly $T = 0$ as lower limit for $n \geq 0$, $T = 1$ for $n = -1$, and $T = \infty$ for $n < -1$. The resulting difference of two integrals is, of course, correct regardless of the lower limits of integration. To avoid inconsistencies, it is recommended that the integration be made directly from $T = 298$ to the temperature of interest.

On page 212, the authors suggest a new empirical formula for the partial heat of mixing in binary systems. The suggested formula may fit approximately data for the partial heat of mixing of one component. Upon introduction into the Gibbs-Duhem equation, however, it follows that the heat of solution of the other component at infinite dilution becomes infinite in contradiction to known data and principles. Thus, equations (81) and (82), even as empirical relations, seem highly objectionable.

Moreover, the authors suggest the formula

$$\Delta\bar{S}_1 = -B \log N_1$$

for the relative partial molar entropy of component 1 in a binary solution of mole fraction N_1 with an empirical value of B.

If B differs from $2.30\,R$, it follows that the partial pressure or the activity of component i at infinite dilution is not proportional to its concentration but proportional to the $(B/2.30\,R)^{th}$ power of concentration, in contradiction to observations and the principles of statistical mechanics.

In view of these remarks, the helpfulness of the parameters listed in Table F on pages 310 to 313 for the thermodynamic quantities of binary solutions is limited.

In spite of these critical comments, this book will be a valuable tool for metallurgists. Many questions can be answered on the basis of information presented in this book. If additional data are needed, this book will be helpful in the planning of experimental investigations.

C. WAGNER

INDUSTRIAL POLISHING OF METALS by Gerald F. Weill. Published by Iliffe and Sons, Ltd., London, 1950. 194 pages, price 21*s.* (now $2.94).

This is one of very few books on the theory and practice of metal polishing. The author is to be commended for concentrating into a small volume useful information on such diverse phases of the subject as the history and theory of polishing; materials, equipment, and methods used; electropolishing; ventilation of polishing rooms; and cost finding. Necessarily the treatment of each subject is brief, but in many cases is as extensive as present knowledge warrants.

The chapter on the "Theory of Polished Surfaces" includes discussion, largely by quotation, of the methods of measuring the degree of polish by optical means, such as the sharpness of a reflected image (Gardam's method), and the measurement of surface roughness by British instruments similar to the Profilometer and Surface Analyzer commonly used in the U.S.A. A reader cannot fail to be impressed with the great need for further research on the difficult problem of defining objectively and quantitatively the appearance of a surface, especially one that is not plane.

In spite of a short "Glossary of Terms," the American reader is puzzled by the use of such words as "bob" and "mop," which correspond respectively to our "polishing wheel" and "buff." Apparently less distinction is made between the terms "polishing" and "buffing" in England than in the U.S.A.

Most of the 80 illustrations depict typical industrial equipment. It is hard to see the justification for publishing a picture of four cans of lime composition (Fig. 41) or three bars of Tripoli composition (Fig. 42). Fifteen interesting photomicrographs of polished steel are scarcely referred to in the text. The book is useful, but it would be more so if the subject matter had been more thoroughly digested and more systematically arranged.

WILLIAM BLUM

PHYSICAL METHODS IN CHEMICAL ANALYSIS, Volume II, edited by Walter G. Berl. Published by Academic Press, Inc., New York, 1951. XII plus 633 pages, $13.50.

This second volume together with Volume I published last year constitutes a good introduction to the present status of a variety of physical methods useful in chemical analysis. The present volume comprises twelve self-contained chapters as follows: Metallurgical Polarographic Analysis by J. Heyrovsky, Conductometric Analysis by H. T. S. Britton, Potentiometric Analysis by H. A. Laitinen, Electrography and Electro-Spot Testing by H. W. Hermance and H. V. Wadlow, Magnetic Methods by A. R. Kaufmann, Determination of Area of Surfaces of

Solids by G. Jura, Surface Tension Measurements by M. Dole, Vacuum Techniques by B. B. Dayton, Gas Analysis by Thermal Conductivity by E. R. Weaver, Measurement of Radioactivity for Tracer Applications by A. Langer, Statistical Analysis by J. Sherman, and Chromatographic Analysis by W. G. Berl.

The purpose of a review book is not to provide an exhaustive account of a given subject critical enough to satisfy the specialist but rather to furnish an orienting view of its general principles, its scope, and limitations. It should aid the nonspecialist in judging the possible application of a given technique to his particular problem and guide him to more specialized treatises and the original literature.

This volume meets these criteria satisfactorily. Indeed some of the chapters approach the completeness of a monograph. For example, the excellent chapter on electrographic analysis by Hermance and Wadlow is the most complete and critical discussion of this subject which this reviewer has seen. In keeping with the book's title, the emphasis in most of the chapters is on fundamental principles rather than details of instrumentology or practical analytical procedures.

JAMES J. LINGANE

ANNOUNCEMENTS FROM PUBLISHERS

CLASSICAL MECHANICS by H. C. Corben and Philip Stehel. Published by John Wiley & Sons, Inc., New York, 1950. 388 pages, $6.50.

A fresh approach has been used by the authors in covering the subject matter of mechanics, in that this book gives detailed applications to problems of current interest. Topics selected from contents are: Kinematics of Particles, The Laws of Motion, Theorems on Systems of Particles, Lagrange's Equations of Motion and Applications, Linear Vector Spaces, Small Oscillations of Conservative Systems, Rigid Bodies, Hamiltonian Theory, Contact Transformations, Poisson Brackets, Further Developments of Transformation Theory, Generalizations and Analogies, Index.

THE BEHAVIOR OF ENGINEERING METALS by H. W. Gillett. Published by John Wiley & Sons, Inc., New York, 1951. 395 pages, $6.50.

This book is for the man who must select the right metal for a given use. Often this includes the design, production, and sales engineer as well as the metallurgist. The presentation, therefore, while completely authoritative, favors simplicity of terms where possible. The *behavior* of metals and alloys is covered rather than the theory that explains the behavior. A brief outline of material shows: basic concepts of metallurgy (six chapters); behavior of principal commercial metals and alloys (nine chapters); special considerations that influence selection, such as machinability, special fabricating techniques, corrosion resistance, etc. (remainder of book).

BIBLIOGRAPHIC SURVEY OF CORROSION, 1946–1947. Available from National Association of Corrosion Engineers, 919 Milam Bldg., Houston, Texas, 1951. 288 pages, $7.00 to Association members, $9.00 to others.

This volume, containing 3000 abstracts of corrosion literature published during 1946 and 1947, is now offered by the National Association of Corrosion Engineers, in accordance with their service of periodically publishing abstracts of corrosion material in book form. The abstracts are arranged topically according to the NACE Abstract Filing Index and cross-referenced for rapid and efficient use. The index was designed for use by both the practical and theoretical corrosion worker. An alphabetically arranged subject and author index are included.

The 1946–1947 Bibliography may be purchased in combination with the 1945 Bibliography at $9.00 to members and $12.00 to others.

NOTES FROM INDUSTRY

Products

SETHCO announces a new filter pump unit (Model HHUE-5). This is a power operated filter equipped with an asbestos-impregnated furfuryl alcohol resin filter cylinder and a Hastelloy pump and fittings. Advantages of Model HHUE-5 are: complete resistance to all electroplating and industrial solutions; higher temperature solutions can be handled; no loss of expensive solutions; crystal clear filtration, and simple operation. For details write SETHCO, 105-07 150th Street, Jamaica, New York.

CATHODIC ETCHER—New, high-vacuum equipment for cathodic etching and for studying metals by this new technique has been announced by Distillation Products Industries, a division of Eastman Kodak Company. With the new etcher the metal to be studied is bombarded with a glow discharge (produced by ions passing between an aluminum anode and the sample of metal) at certain low pressures. Thus, the etching is produced physically rather than chemically, with less danger of forming oxides and other chemical artifacts, and the crystal shapes and other characteristics are brought out with greater clarity. The new etcher is especially useful for studying cold flow lines, for pure research in metallurgy and in production sampling.

For full information, write: Distillation Products Industries, Vacuum Equipment, Rochester 3, New York.

THE WELSBACH CORPORATION, Philadelphia, Pa., has announced a new model laboratory ozonator (Model T-23). It replaces earlier models and is designed to produce laboratory quantities of ozone with greater flexibility and ease of operation. Model T-23 is intended for testing the potential value of ozone as an oxidizing agent in various chemical processes, in phenols and cyanide destruction in industrial wastes, and in reduction of tastes, odors, and color in water purification. Complete information will be sent on request.

THE VANTON PUMP CORPORATION, Empire State Building, New York City, has available a new P Series of noncorrosive and noncontaminating "flex-i-liner" pumps in which the fluid transferred comes in contact only with a polyethylene body block and a vinyl "flex-i-liner." The pumps withstand the extreme corrosive action of strong acids, caustics, and other chemicals to which polyethylene and vinyl are resistant. The design eliminates such troubles as stuffing boxes, packing glands, shaft seals, etc., and may be used for pharmaceutical applications as there is no lubricant or contact with metal. Capacities range from fractional to 5 gpm.

GENERAL ELECTRIC'S INDUSTRIAL HEATING DIVISIONS are offering an improved electronic type 20-kw induction heater, featuring a nonventilated, dustproof, NEMA Type 12 enclosure. The new heater, for use in high-speed annealing, brazing, hardening, and soldering, is designed so that only controls and accessories need be purchased for particular applications. It can be used

for long- or short-run production, weighs about 3,600 lb. Bulletin GEA-5594, giving particulars, is available from General Electric Company, Schenectady 5, N. Y.

RECENT PATENTS

Selected for electrochemists by Fred. W. Dodson, Chairman of the Patent Committee, from the Official Gazette.

February 20, 1951

Ruben, S., 2,542,575, Alkaline Dry Cell
Ruben, S., 2,542,576, Alkaline Cylindrical Dry Cell
DePoy, S. M., 2,542,637, Method of Rectifying a Neutral Salt Heat-Treating Bath
Ruben, S., 2,542,710, Alkaline Dry Cell
Neill, W. J., 2,542,779, Electropolishing Composition and Process
Abel, E., 2,542,888, Electrochemical Processes of Producing Manganese from Aqueous Manganese Salt Solution
MacFarland, A. M., 2,542,934, Dry Cell Construction
Kinsey, H. V., 2,542,962, Nickel Aluminum Base Alloys

February 27, 1951

Newcombe, F. A., Application 552,769, Electrode Handling Apparatus
Linder, E. G., Application 90,331, Vacuum Tube Leak Detector
Carter, C., and Glass, J. V. S., 2,542,989, Electrolytic Cell
Carter, C., and Ravenscroft, A. W., 2,542,990, Electrolytic Cell
Cobb, H. W., 2,542,994, Electrolytic Surface Treatment of Steel
McKay, K. G., 2,543,039, Bombardment Induced Conductivity in Solid Insulators
Nachod, H. J., 2,543,048, Photocell
Rawles, W. T., 2,543,059, Apparatus for Electrowinning or Electroplating of Metals
Harriss, L. H., 2,543,106, Deferred Action Primary Battery
Uber, J. J., 2,543,137, Battery Separator
Dodd, A. E., 2,543,314, Battery-Charging Apparatus
Okolicsanyi, F., 2,543,331, Thermopile
Kling, A. J., 2,543,369, Thermocouple Tube
Calingaert, G., 2,543,399, Process for Recovery of Calcium in Admixture with Sodium
Hill, E. F., and Soroos, H., 2,543,407, Process for Recovery of Calcium in Admixture with Sodium
Coomes, E. A., and Forsbergh, P. W. Jr., 2,543,439, Method of Manufacturing Coated Elements for Electron Tubes
Anderson, H. G., 2,543,540, Battery Terminal Connector
Faust, C. L., Bearse, A. E., and Lieger, A. W., 2,543,545, Electrodeposition Bath for Bright Zinc
Swift, L. M., 2,543,675, Method and Apparatus for Adjusting Spacing Between Neutron Source and Detector
Thayer, J. M., and Fearon, R. E., 2,543,676, Method and Apparatus for Neutron Well Logging
Tumulo, G., 2,543,678, Method of Producing Rectifier Elements
Rice, R. E., and Matthew, W. P., 2,543,708, Heat-Treating Furnace
Schmidt, P. L., and Hill, L. R., 2,543,710, Process for Producing Insulating Iron Oxide Coatings
Iwanowski, E. C., 2,543,724, Battery Filling Means

March 6, 1951

Conner, J. C. Jr., 2,543,763, Electrolytic Reduction of Hydroperoxides
Hester, F. A., and Smith, J. W., 2,543,779, Facsimile Safety Device
Weil, L., 2,543,817, Photochemical Oxidation of Nicotine
Glassbrook, C. I., 2,544,078, Radio-Frequency Spectrometer
Schneider, F. A., 2,544,112, Sintered Battery Plate and Process of Making
Wagner, M., 2,544,115, Leakproof Battery
de Nora, O., 2,544,138, Electrolytic Cell with Mobile Mercury Cathode
Reimert, L. J., and Fatzinger, E. A., 2,544,236, Zinc Oxide-Magnesium Oxide Luminous Pigments Activated by Bismuth or Bismuth and Iron
Benard, J. A. V., 2,544,250, Method of Mounting and Locking Optical Lenses in a Housing
Stuart, K. E., and Osborne, S. G., 2,544,285, Electrolytic Cell
Lyon, D. W., 2,544,507, Alkaline Earth Sulfide Phosphorescent Pigments
Prahl, F. A., 2,544,510, Apparatus and Method for Plating Strips
Wheat, G., 2,544,517, Method of Making Batteries

March 13, 1951

Fortney, D. F., and Moran, G. L., 2,544,663, Method of Making a Calcium Halophosphate Phosphor
Notvest, R. W., 2,544,802, Method for Electrolytic Determination of Lead and Copper
Ornhjelm, R. M. R., 2,545,376, Electrolytic Cell with Mercury Cathode
David, W., 2,545,137, Corrosion Inhibitors
David, W., 2,545,138, Corrosion Inhibiting Compositions
Messinger, W., and Lytle, D. B., 2,545,294, Anode Control for Plating Tanks
Perret-Bit, R. J., 2,545,411, Device for Regulation of the Resistance of an Electrolytic Cell
Perret-Bit, R. J., 2,545,412, Apparatus for the Regulation of Current in an Electrolytic Cell
Perret-Bit, R. J., 2,545,413, Apparatus for Automatic Regulation of Electrolytic Cells

March 20, 1951

Booe, J. M., 2,545,566, Electrodeposition of Metals and Alloys
Lambert, R. E., 2,545,619, Electric Glass Furnace
Hagelston, P. J., and Ives, R. S., 2,545,695, Electrode Coating
Froelich, H. C., 2,545,880, Nonphosphorescent Calcium Silicate Phosphor Containing Indium

March 27, 1951

Brenner, A., Burkhead, P. S., and Riddell, G. E., 2,546,150, Method for Securing Adhesion of Electroplated Coatings to a Metal Base
Rothschild, S., 2,546,239, Method of Preparing Zinc Sulfide Phosphor
Briggs, R. E., 2,546,254, Electrolytic Water Treating Cell
Hilty, D. C., 2,546,340, Process for Producing Low-Carbon Chromium Steels
Woodring, W. B., and Reinhardt, O. K., 2,546,379, Dry Cell and Method of Making Same
Sheridan, C. M., and Pruger, T. A., 2,546,525, Alloy for Use as a Pot or Container for Molten Light Metals
Koster, J., 2,546,547, Electrodeposition of Manganese
Koster, J., 2,546,548, Anode for Electrowinning Manganese and Method of Making the Same
Cupps, C., 2,546,920, Electroplating and Electropolishing Apparatus
Leman, D. L., and Casey, J. J., 2,546,931, Magnesium Alloy

April 3, 1951

Smith, W. N., Application 695,523, Production of Alkali Metal Bicarbonate and Chloride
Herwig, R. S., 2,547,120, Process for Plating a Carbon or Graphite Part with Chromium
Sartakoff, J. D., 2,547,231, Electro-os-

motic Isolation of Streptomycin
Greenstein, S., 2,547,262, Multiple Dry Cell Battery
Hurley, S. C. Jr., Hurley, W. L., executrix of said S. C. Hurley, Jr., deceased, 2,547,324, Apparatus for Determining the Voltage of a Battery
Brennan, J. B., 2,547,371, Electrolytic Condenser
Morin, F. J., 2,547,406, Method and Means for Controlling the Resistance of Oxidic Semiconductors
Webster, H. G., 2,547,510, Composition and Process for Electrolytic Cleaning of Metals
Pollard, C. E. Jr., 2,547,536, Formation of a Surface Easily Wettable by Mercury
Smith, A. L. J., 2,547,790, Calcium Beryllium Silicate Phosphor
Stordy, J. J., 2,547,795, Electric Annealing Furnace
Keilholtz, G. W., and Jerome, C. W., 2,547,869, Fluorescent Lamp Electrode
Fry, A. B., Kirk, R. C., and George, P. F., 2,547,907, Magnesium Primary Cell
Fry, A. B., Kirk, R. C., and George, P. F, 2,547,908, Primary Cell
George, P. F., Fry, A. B., and Kirk, R. C., 2,547,909, Primary Cell

April 10, 1951

Levin, I., 2,547,951, Rectifier
Jacobs, H., 2,548,110, Method of Activating Oxide Coated Cathodes
Kleis, J. D., 2,548,164, Electrical Contact
Deo, C. W., 2,548,256, Battery Carrier
Chester, A. E., and Seymour, D. F., 2,548,419, Method for Production of Lustrous Zinc
Chester, A. E., and Leonelli, B., 2,548,420, Method of Producing Lustrous Zinc
Bramley, Jr., 2,548,514, Process of Producing Secondary-Electron-Emitting Surfaces
Raney, R. M., 2,548,558, Storage Battery
Sachs, C. C., and Bond, J., 2,548,685, Photopolymerization Process and Compositions

Chemical Translations
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Werner Jacobson, B.S., M.S.
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334 South Mozart Street Chicago 12

Banks, W. H., Upton, P. B., and Scott, J. R., 2,548,765, Method of Producing Electroforms
Goodnight, A. G., 2,548,782, Battery Terminal Clamp
Taylor, C. R., and Staley, C. F., 2,548,849, Elimination of Hydrogen from Heats of Killed Steel

April 17, 1951

Chester, A. E., 2,548,867, Electroplating Metals
Miley, A. M., and White, J. E., 2,548,995, Vent Plug
Kaswell, E. R., 2,549,099, Process for Stripping Color from Dyed Wool
Seabury, D. S., Buckingham, W. D., and Deibert, C. R., 2,549,249, Method of Drawing Filled Tantalum Tubes
Winninghoff, W. J., 2,549,355, Fluorescent Lamp
Bell, H. M. III, and Schweikher, E. W, 2,549,411, Electrolytic Stripping of Nickel Coatings from Ferrous Metals
Hamilton, J. G., Putnam, T. M., and Wiens, J. H., 2,549,596, Beryllium Target and Method of Manufacture
Kennedy, J. M., Lee, H. J., and Knight, A. P., deceased, by Knight, N. R., executrix, 2,549,610, Method of Electroplating
Fiandt, R. M., 2,549,678, Method of and Apparatus for Electroforming Metal Articles
Wiesner, H. J., 2,549,737, Method of Electropolishing

EMPLOYMENT SITUATIONS

Please address replies to box shown, c/o The Electrochemical Society, Inc., 235 West 102nd Street, New York 25, N. Y.

Positions Wanted

ELECTROCHEMIST AND CHEMICAL ENGINEER, Ph.D., 37 years old, academic and industrial experience on design of electrolytic processes, abrasive research, and direction of graduate research. About 25 publications and patents. Will consider foreign as well as domestic employment. *Reply to Box 343.*

PHYSICAL CHEMIST, Ph.D. 1948, desires position with small or medium sized company in the Middle West. Three years' fundamental research on high polymers and inorganic chemicals for large eastern concern. Desires development work and more responsibility. Academic work in electrochemistry. Inactivated Naval Reservist, 30, married, family, now employed. *Reply to Box 344.*

New Members

(*Continued from page 99C*)

PAUL JUNIERE, L'Aluminium Francais, 23, rue Balzac, Paris 8, France (Electrodeposition)
HERBERT H. KELLOGG, School of Mines, Columbia University, New York 27, N. Y. (Theoretical Electrochemistry)
JOHN M. KOPPER, Johns Hopkins University, Baltimore 18, Md. (Electrodeposition)
NICHOLAS J. KRILANOVICH, Room 330, Bldg. 92, National Bureau of Standards, Washington 25, D. C. (Electric Insulation and Theoretical Electrochemistry)
LEON MARKER, Department of Chemistry, University of Nebraska, Lincoln, Neb. (Corrosion and Theoretical Electrochemistry)
ALFRED E. MARTIN, Sylvania Electric Products Inc., mailing add: 226 W. 137th St. New York 30, N. Y. (Electronics)
LESTER L. R. PHILLIPS, Hurlbut Paper Company, South Lee, Massachusetts (Electric Insulation)
JAMES N. SARMOUSAKIS, Department of Chemistry, New York University, University Heights, New York 53, N. Y. (Theoretical Electrochemistry)
JULIUS A. SZILARD, General Cable Corporation, mailing add: 321 Hyslip Ave., Westfield, N. J. (Corrosion and Electric Insulation)
JOHN C. WILSON, Tung-Sol Lamp Works, mailing add: 4 Wilber Terrace, Bloomfield, N. J. (Electronics)
LING YANG, Metals Research Laboratory, Carnegie Institute of Technology, Schenley Park, Pittsburgh 13, Pa. (Theoretical Electrochemistry)

Associate Members

BORIS LEVY, Sylvania Electric Products Inc. Mailing add: 2464 E. 21st St., Brooklyn 35, N. Y. (Electronics)
CHARLES S. PORTER, National Bureau of Standards, R. 330, O.D., Washington 25, D. C. (Electric Insulation, Industrial Electrolytic, and Theoretical Electrochemistry)
THOMAS C. VINCENT, General Electric Company, mailing add: 15776 Euclid Ave., E. Cleveland, Ohio (Electronics)
MARTIN HERTZBERG, Naval Research Laboratory, Mailing add: 3351 Brothers Place, S.E., Washington, D. C. (Theoretical Electrochemistry)

Student Associate Member

AUGUST J. STAPF, University of Cincinnati, mailing add: 306 Washington St., Hamilton, Ohio (Corrosion and Electrodeposition

FUTURE MEETINGS OF
The Electrochemical Society

Detroit, October 9, 10, 11, and 12, 1951

Sessions on

Corrosion, Electrodeposition, Electro-Organic Chemistry

Round Table on "Power Supply and Requirements for Electrochemical Industries"

Tentative Battery Round-Table Discussion

Headquarters at the Statler Hotel

* * *

Philadelphia, May 4, 5, 6, 7, and 8, 1952

FIFTIETH ANNIVERSARY MEETING

Sessions on

Electric Insulation, Electrothermics, Instrumentation, Luminescence, Methods of Applying Phosphors, Rare Metals, Theoretical Electrochemistry

Headquarters at the Benjamin Franklin Hotel

* * *

Montreal, October 27, 28, 29, 30, and 31, 1952

Headquarters at the Mt. Royal Hotel

* * *

New York, April 12, 13, 14, 15, and 16, 1953

Headquarters at the Statler Hotel

Papers are now being accepted for the fall meeting, to be held in Detroit. Abstracts (not exceeding 75 words in length) are due at the Secretary's Office, 235 West 102nd Street, New York 25, N. Y., *not later than August 1, 1951* Complete manuscripts should be sent in triplicate to the Editor of the JOURNAL at the same address.

Annual Report of the Board of Directors

During the year of 1950, eight meetings of the Board of Directors or its Executive Committee were held. Full details of the business transacted at these meetings are contained in the minutes, on file in the Secretary's office, where they may be consulted by any member of the Society. Only the important items of business transacted during the year 1950 are detailed here.

The principal change in operating procedure was originated at the Cleveland Meeting. At this time, it was decided to discontinue the practice of holding Executive Committee meetings once a month since their principal function was the authorization of payment of bills and election of new members. These functions were taken care of by authorizing the payment of bills by mail, and empowering the Membership Qualifications Committee to elect members.

The regular schedule of Board meetings was then set up as follows: the annual meeting in April, at which the new officers are installed; a meeting during the month of July; a meeting in connection with the fall meeting of the Society; a December meeting to wind up the affairs of the Society for the fiscal year; and another meeting either in January or early February, at which time the results of the elections are to be announced, giving the incoming officers sufficient time to prepare the list of standing committees so that no time will be lost at the change-over from old to new officers. This schedule is contingent upon the acceptance by the membership-at-large of a revised form of the Constitution, which was passed by the Board of Directors at its Cleveland Board meeting, and will be acted upon at the annual meeting on April 9, 1951, in Washington, D. C., following which a mail vote of the membership will be taken.

The policy with regard to fiscal affairs of the Society has been further revised in line with the separation of the duties of Editor and Secretary. Since the JOURNAL received a budget for its operation, it was felt that it was only fitting and proper that the Editor and Business Manager of the JOURNAL should have control over the budgeted funds. Therefore, the practice has been followed of getting approval for payment of Secretarial expenses from the Secretary and the President, and approval for JOURNAL expenses from the Editor and Business Manager.

During the year 1950, it was decided that the Society would no longer furnish bound volumes of the JOURNAL to its membership.

At the July 8 Board meeting, the Palladium Medal of The Electrochemical Society was established. This medal is to be awarded for outstanding achievement in the field of electrochemistry or corrosion and is established from the Corrosion Handbook Funds in conjunction with the International Nickel Company, which has graciously agreed to supply the palladium metal from which the medals are struck, with replicas in nickel which will also be given the Medalist. The first Palladium Medal is to be given in the year 1951.

At the December 2 Board meeting the Board established a Prize Essay Contest. This contest awards two prizes for the best and the second-best undergraduate student essay, the first prize to consist of $100 and a student associate membership for one year, and the second prize to consist of $50 and a student associate membership for one year. The closing date for the first contest will be July 1, 1951.

The Acheson Award was presented to George W. Vinal at the Buffalo Meeting of The Electrochemical Society. The Young Author's Prize of $100 was awarded to Michael A. Streicher and the Turner Book Prize was awarded to Ralph F. Hoeckelman. The Weston Fellowship for the year 1950 was inactive.

Annual Report of the President

The Society this year started reaping the benefits of the changes in policies begun four years ago. Our meetings in Cleveland, Buffalo, and here in Washington, D. C., are the largest in the history of the Society from the standpoint of number of papers, number of technical sessions, and attendance. These records were made possible by the smooth-functioning National Office under the guidance of our Secretary, Dr. Linford, and the improved quality of our publications under the guidance of our Publications Committee, advised by Dr. R. M. Burns; by our Editor, Dr. H. H. Uhlig; and the staff: Mr. F. L. LaQue, Business Manager; Miss Eleanor Reid, Managing Editor; and the various Divisional Editors.

The present situation of high costs required that the Society explore every possible means of making ends meet. Mostly, this meant finding more income. Investigation of the possibilities of advertising in the JOURNAL was selected by your Board of Directors as a means of bringing income without large increase in membership dues. The position of advertising has been determined, and present indications are that a small, but nonetheless significant, amount of income can be expected. Our Advertising Manager, Mr. Ellis, turned in a good job for us on this program.

Along the lines of increasing income, an increase in membership dues was found necessary. The Board hopes that further increases will not be needed, but conditions beyond our control will be the deciding factor.

The Society owes a vote of thanks to the many members (and to their business firms that made their activities possible) who have donated their time to the publications. This includes two books—*Modern Electroplating* and *Corrosion Handbook*. Both remain as outstanding successes. Second editions of each are under preparation.

The Board of Directors has authorized the publication of an Electrochemical Monograph Series, of which *Modern Electroplating* and *Corrosion Handbook* are the beginning. Three to four additional books are anticipated in the near future.

Several Local Sections in university centers have been asked to sponsor symposia on Electrochemistry in the Natural Sciences. It is hoped that such activities will be the forerunners of one or more new divisions in the natural sciences in the future.

The Board of Directors, the Ways and Means Committee, and the Committee for the Advancement of the Science and Technology of Electrochemistry have continued actively to explore the problem of unavailability of new men with training in the principles of electrochemistry, electrochemical techniques, instrumentation, and applications in industry. This activity, headed by Past President Ferguson, now has

considerable facts and, before long, will be able to map out a program.

There is need for greater salesmanship on the part of the members, the Divisions, and the Local Sections. The Society needs new members, and the Membership Committee needs the assistance of every member. There is need for all our industrial members to influence their managements in seeking men with electrochemical training where employment involves electrochemical principles and techniques. Personnel men should be instructed to ask universities for men who have had course work in electrochemistry. The need today for chemists, chemical engineers, metallurgists, metallurgical engineers, electrical engineers, biologists, medical people, and agriculturalists to know electrochemistry is greater than ever before. Yet, there is less teaching of electrochemistry now in universities and colleges.

In the election this year, the largest vote was cast in the history of the Society; over 30 per cent of the members voted. This is a splendid record of membership interest in Society affairs. It far overshadows the per cent vote in the recent American Chemical Society election. CHARLES L. FAUST

Annual Report of the Secretary

Report on Membership for 1950

Membership as of January 1, 1950		1882
Qualified as members in 1950		173
Reinstated members		11
Total		2066
Deaths during 1950	10	
Members dropped in 1950 and resignations	67	77
Membership as of December 31, 1950		1989
Net increase		107

Composition of Total Membership, January 1, 1951

	Active	Associates	Student Associates	Total
United States	1695	22	6	1723
Canada	54	1		55
England	42			42
India	18			18
Other Foreign	150	1		151
Total	1959	24	6	1989
Emeritus				32
Honorary				8
Sustaining				56
Grand Total				2085

Report of Tellers of Election

For President: Ralph M. Hunter, 707; scattered votes, 7 abstentions, 15. Total: 729.

For Vice-President: M. J. Udy, 416; M. E. Stareck, 155; J. F. Gall, 152; abstentions, 6. Total: 729.

Signed: Herbert Dengler, *Chairman*
Robert V. Jelinek
Sherman Weidenbaum
Tellers of Election

Secretary's Financial Report for 1950

As Audited by Mr. H. K. Leicht, 463 West Street, New York, N. Y.

BALANCE SHEET

December 31, 1950

Assets

Furniture and Office Equipment	$ 2,055.00
Cash	10,447.59(*a*)
U. S. Savings Bonds (Cost)	36,260.00(*b*)
Inventory—Bound Volumes	7,546.80
Accrued Income on U. S. Savings Bonds	3,579.00
Total	$59,888.39

(*a*) Includes: $2,131.20 Corrosion Division Fund
(*b*) Includes: $10,471.37 Corrosion Division Fund; $300.00 Columbus Convention Committee Fund; $100.00 Columbus Rotating Convention Fund

Liabilities, Reserves, and Surplus

Accounts Payable—Suppliers	$ 4,558.28
Taxes Withheld from Salaries	273.11
Life Memberships	1,599.44
Prepaid Sustaining Memberships	200.00
Prepaid Subscriptions	1,607.96
Reserve for Depreciation	299.02
Surplus	51,350.64 (*c*)
Total	$59,888.39

(*c*) Includes: $13,002.57 Applicable to Funds detailed in (*a*) and (*b*)

CASH STATEMENT

January 1 to December 31, 1950

National City Bank		
Book balance December 31, 1949		$9,917.34
Receipts—1950 (Gross)	$63,792.05	
Disbursements—1950 (Gross)	65,393.96	
Excess disbursements over receipts		1,601.91
Book balance December 31, 1950		$8,315.43
New York Savings Bank		
Book balance December 31, 1949	$5,049.28	
Interest—1950	76.10	$5,125.38
Transferred to National City Bank—1950		4,147.98
Book balance December 31, 1950		$977.40

Dry Dock Savings Bank		
Book balance December 31, 1949	$5,016.66	
Interest—1950	50.16	$5,066.82
Transferred to National City Bank—1950		5,066.82
Book balance December 31, 1950		0.00
Corn Exchange Bank Trust Company		
Book balance December 31, 1949		$479.06
Receipts—1950	$33,127.51	
Disbursements—1950	32,475.79	
Excess receipts over disbursements		651.72
Book balance December 31, 1950		$1,130.78
Cash on hand—Agent—December 31, 1950		23.98
Total book balances and cash on hand, December 31, 1950		$10,447.59

Total book balances and cash on hand, December 31, 1950, accounted for as follows:	
National City Bank	$ 8,315.43
New York Savings Bank	977.40
Corn Exchange Bank	1,130.78
Cash on hand—Agent	23.98
Balance, as above	$10,447.59
Agent's Authorized Advance—Corn Exchange Bank Trust Company	
In book balance December 31, 1950	$ 1,130.78
Cash on hand	23.98
Voucherable items	2,845.24
Agent's authorized balance	$ 4,000.00

Analysis of Income (Net)
January 1 to December 31, 1950

Dues: 1947	$ 10.00
1948	40.00
1949	110.00
1950	9,553.96
1951	12,294.55
Volumes: 1948	12.00
1949	40.00
1950	522.50
Sales: Publications	1,276.07
Preprints	142.70
Reprints	268.47
Modern Electroplating	887.53
Thompson Monograph	51.70
Cathodic Protection	1,539.27
Deutschen-Bunsengesellschaft	256.50
Faraday Society	2,864.80
Subscriptions: Journal	6,460.85
Volumes	3,646.64
Sustaining Memberships	1,600.00
Advertising	2,278.67
Corrosion Division	2,131.20
Conventions	895.35
Emblems	24.89
Interest—Savings Accounts and Redeemed U. S. Bonds	206.26
Total Income	$47,113.91

Analysis of Expenditures (Net)
January 1 to December 31, 1950

Furniture and Office Equipment		$ 137.09
Publication Department		
General Expenses:		
Salaries, Full-time	$11,674.83	
Wages, Part-time	1,594.94	
Stationery and Supplies	1,229.60	
Misc. (Office)	551.96	
Rent	810.00	
Postage and Express	578.63	
Traveling	1,388.47	
N. Y. State Disability Tax (Employer)	2.43	
	17,830.86	
Publication Expenses:		
Journal	$18,489.80	
Volumes: 93	2,158.22	
94	2,254.12	
95	1,567.02	
Modern Electroplating	75.00	
Total—Publication Dept.	24,544.16	42,375.02
Secretary's Department		
Salaries, Full-time	$11,490.81	
Wages, Part-time	265.58	
Stationery and Supplies	964.38	
Misc. (Office)	1,179.87	
Rent	810.00	
Postage and Express	1,204.61	
Audit	160.00	
Prizes	100.00	
Local Sections:		
Philadelphia	65.00	
Cleveland	121.00	
Metropolitan	220.00	
Detroit	93.00	
Midland	69.50	
San Francisco	56.00	
Washington-Baltimore	73.00	
Publications Committee	312.68	
Electronics Division	50.00	
Traveling Expenses	375.31	
Expenses of Officers	602.98	
N. Y. State Disability Tax (Employer)	2.55	
Total—Secretary's Dept.		$18,216.27
Total Expenditures		$60,728.38
Excess expenditures over income		$13,614.47
Accounted for as follows:		
Surplus (reduction)		$13,477.38
Furniture and Office Equipment		137.09
		$13,614.47

Treasurer's Report for 1950

Canadian Future Convention Fund

The Canadian Bank of Commerce, Toronto	
Balance, 1/1/51	$1,104.20

Corrosion Handbook Fund

Corn Exchange Bank, 1/1/51		
USA Bonds Ser. F (earmarked in safe deposit box)		$10,471.37
New York Savings Bank, 1/1/51		
Balance 5/15/50	$977.40	
Credit: Interest to 1/1/51	9.79	
Balance		987.19
National City Bank, 1/1/51		
In Electrochem. Soc. Checking Acct.		1,153.80
Total Corrosion Handbook Fund, 1/1/51		$12,612.36

Columbus Convention Committee Fund

Corn Exchange Bank, 1/1/51	
USA Gov. Bonds Ser. F (earmarked in safe deposit box)	$ 300.00

Columbus Rotating Convention Fund

Corn Exchange Bank, 1/1/51	
USA Gov. Bonds Ser. F (earmarked in safe deposit box)	$ 100.00

Edward Weston Fellowship Fund—for 1950

Capital Fund Securities, 1/1/51

$9,000.00	USA Savings Bonds Series G, 2½%. Maturity 5/1/59
2,800.00	USA Treasury Bonds, 2½%. Maturity 6/15/67-62
1,836.66	Allowed claim, NYT & M Co., 1330 Brook Avenue, Bronx, N. Y.
1	Prudence Co., Inc., 1st Mortgage. Covering property at 422-34 East 86th St., New York, N. Y., allowed claim

Total Weston Funds Available for Fellowship 1/1/50		$1,998.38
Central Hanover Bank & Trust Co., Trustees		
Principal Account Balance, 1/1/50	$145.83	
Credit: Interest on bonds and other accruals	37.11	
Principal Account Balance, 1/1/51	182.94	
Checking Account Balance, 1/1/50	850.15	
Credit: Transfer from Income Account, 9/12/50	278.41	
Checking Account Balance, 1/1/51		1,128.56
Income Account Balance, 1/1/50	146.53	
Credit: Interest on Bonds	295.00	
	441.53	
Debit: Comm. and other charges	295.00	
Income Account Balance, 1/1/51		146.53
Seaman's Bank For Savings		
Income Balance, 1/1/50	1,001.70	
Credit: Interest for 1950	20.12	
Income Balance, 1/1/51		1,021.82
Total Weston Funds Available for Fellowship, 1/1/51		$2,296.91

Edward Goodrich Acheson Fund—for 1950

Capital Fund Securities, January 1, 1951

During 1950 there were no stock or bond redemptions, and no bonds were purchased. Therefore the capital securities are the same as listed for January 1, 1950, shown in the July 1950 JOURNAL, p. 164C.

Acheson Fund Total Balance, 1/1/50		$3,654.48
Guaranty Trust Company, *Custodian*		
Income Balance, 1/1/50 (includes Prin. Fds. of $97.43)		2,963.20
Credit:		
Dividends plus interest		991.50
		3,954.70
Debits:		
Custodian Charges	72.00	
Medal Art Company	429.21	
Check to G. W. Vinal	1,000.00	1,501.21
Income Balance, 1/1/51 (includes Prin. Fds. of $97.43)		2,453.49
East River Savings Bank		
Principal Funds Balance, 1/1/50		691.28
Interest for 1950		13.89
Principal Funds Balance, 1/1/51		705.17
Acheson Fund Total Balance, 1/1/51		$3,158.66

Roeber Research Fund—for 1950

Balance, 1/1/50	$5,006.14
Credit: Interest for 1950	100.62
Balance, 1/1/51	$5,106.76

EAST RIVER SAVINGS BANK
Amsterdam Avenue at 96th Street, New York, New York

Joseph W. Richards Memorial Fund—for 1950

Balance, 1/1/50	$3,612.82
Credit: Interest for 1950	72.60
Balance, 1/1/51	$3,685.42

CENTRAL SAVINGS BANK
Broadway at 73rd Street, New York, New York